

## Aquifer Protection Permit

P-512364

Place ID 150393, LTF 65664

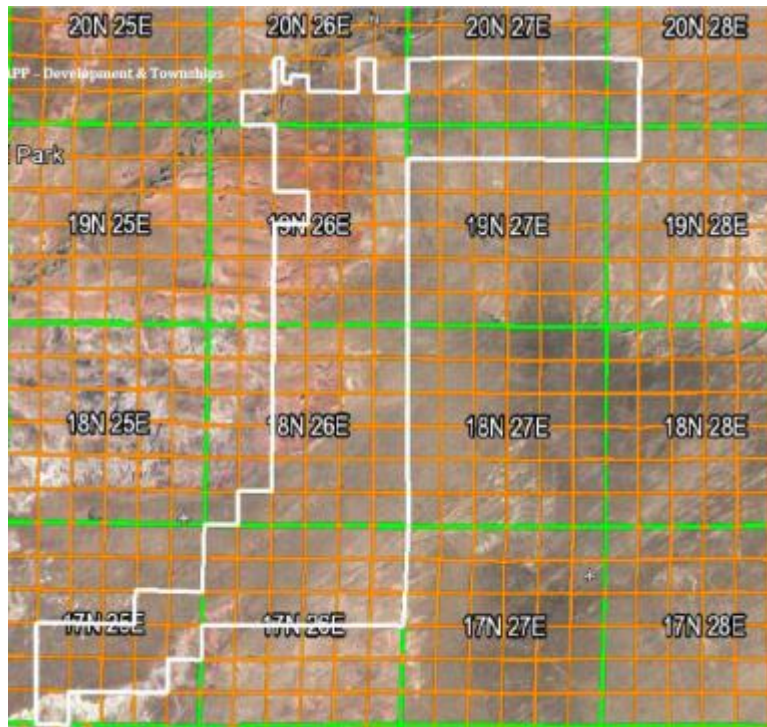
Ranger Development

The Arizona Department of Environmental Quality (ADEQ) proposes to issue an Aquifer Protection Permit (APP) for the subject facility that covers the life of the facility, including operational, closure, and post closure periods unless suspended or revoked pursuant to Arizona Administrative Code (A.A.C.) R18-9-A213. This document gives pertinent information concerning the issuance of the permit. The requirements contained in this permit will allow the permittee to comply with the two key requirements of the Aquifer Protection Program: 1) meet Aquifer Water Quality Standards (AWQS) at the Point of Compliance; and 2) demonstrate Best Available Demonstrated Control Technology (BADCT). BADCT's purpose is to employ engineering controls, processes, operating methods or other alternatives, including site-specific characteristics (i.e., the local subsurface geology), to reduce discharge of pollutants to the greatest degree achievable before they reach the aquifer or to prevent pollutants from reaching the aquifer.

## I. FACILITY INFORMATION

### Name and Location

Permittee's Name:	Ranger Development, LLC
Mailing Address:	Ranger Development, LLC 5001 LBJ Freeway, Suite 300 Dallas, TX 75244
Facility Name and Location:	Ranger Development Approximately 10 miles Southwest of Chambers, Arizona, Apache County Wells will be located in the area outlined in white below



## Regulatory Status

This application was received on August 23, 2017.

## Facility Description

In 1961, Kerr McGee Corporation and Eastern Petroleum began the extraction of helium from geological structures in Apache County, Arizona. These companies curtailed their operations around 1976 because the reserves had either been depleted or had become unprofitable due to a large drop in helium prices. Currently, Ranger Development, LLC (Ranger) is seeking to extract the remaining helium in these reservoirs, using wells that are/will be located on subsurface mineral leases on state and/or private (or fee) lands. Ranger currently operates seven (7) helium extraction wells and has either received approval, or is in the process of receiving approval, from the Arizona Oil and Gas Conservation Commission (OGCC) to operate five (5) additional wells. Ranger has plans to operate more than 80 wells during the life of the development. Once the well gas is extracted, it is routed via piping and minimal compression to the "Apache Plant." At the Apache Plant, the well gas is treated at a helium recovery skid to remove the nitrogen and other minor non-helium components, leading to a "helium rich" product gas, which is then compressed for transport to customers.

Some of the target helium is located at the top of the Coconino Formation, approximately 950 ft. underground, in the development area. Other helium is located in the sands of the Shinarump Formation, approximately 750 ft. underground and approximately 150 ft. above the Coconino Formation. The Coconino Formation is saturated with high Total Dissolved Solids (TDS) water and the helium is trapped at the top of the formations at the gas/water interface of the formation. The location of the helium deposits in the Shinarump Formation interval is scattered depending on sand body deposition and not localized in one area. Due to these considerations, Ranger is proposing to conduct well "stimulation" campaigns, as needed, only in the Shinarump Formation to recover the helium at specific locations. Well stimulation is a process where fluid is injected into a gas well to increase the flow of gas to the well so that the gas can be removed from underground.

It is not possible to identify the exact wells, intervals within the Shinarump Formation, and locations that will be subject to the stimulation campaigns. Such determinations of well location and stimulation intervals are based on an extensive geological survey, pilot drilling, sampling, etc. As a result, Ranger is seeking authorization to conduct the stimulation campaigns on any location within the Shinarump Formation within the confines of the development boundary, subject to ADEQ permit conditions. Note that Ranger will not be performing any stimulation campaigns directly in the Chinle, Moenkopi or Coconino Formations. Groundwater occurs at several varying depths at the project site, but is generally found between the surface and approximately 350 ft. below ground surface (bgs) in the Chinle, and approximately 950 ft. bgs in the Coconino. Some drinking water wells in the project area are drilled in a much shallower interval and extend into alluvium or the uppermost unit of the Chinle at approximately 50 ft. bgs.

Stimulation campaigns are generally 45 to 60 minutes in duration and are only conducted once during the life of a well in a particular sand interval. There are two main types of stimulation campaigns that can be executed individually or cumulatively in an interval, and that Ranger may pursue.

- Acid stimulation - where acid is used to "etch" channels in the rock that comprise the walls of the fracture; and/or
- Proppant stimulation – where a propping agent (e.g., sand) is used to prop open the fracture.

Stimulation campaigns are conducted based on specific stimulation designs considering the formation characteristics encountered in each well. Stimulations are designed to avoid communication with any potential water productive interval around the stimulation location and are based on various factors such as sand thickness, porosity and permeability. During the stimulation activity, various parameters are monitored including the surface pressure being applied to the stimulation materials (or "slurry") in the well, rate of injection of the slurry, and the flow of nitrogen gas being applied to the slurry.

## II. BEST AVAILABLE DEMONSTRATED CONTROL TECHNOLOGY (BADCT)

The BADCT for stimulation campaigns in the wells includes the design and construction of the wells, the site specific geology of the development area, pre-operational requirements for evaluating the well construction, and operational

requirements for conducting the well stimulations. The specific BADCT requirements for the wells are in permit Section 2.2.

### III. COMPLIANCE WITH AQUIFER WATER QUALITY STANDARDS

#### Monitoring and Reporting Requirements

Groundwater monitoring is not required by the permit. The permit requires that an annual report be provided which summarizes the status of each well and certification that the well stimulation was conducted in accordance with the permit conditions.

#### Points of Compliance

Each well will have a corresponding point of compliance location at a distance of 300 ft. northwest of the well. This location was determined based on the estimated maximum travel distance of the stimulation materials and the regional direction of groundwater flow in the Coconino Formation to the northwest.

### IV. STORM WATER and SURFACE WATER CONSIDERATIONS

The development area is located in the vicinity of the Puerco River. Stimulation campaigns are not expected to impact stormwater or surface water because these activities are being conducted in the Shinarump Formation at a depth of approximately 750 ft. below ground surface.

### V. COMPLIANCE SCHEDULE

The compliance schedule includes a requirements to update the closure costs and associated financial assurance mechanism prior to conducting stimulation campaigns on any wells beyond the first 8 listed in the permit. The closure costs and financial assurance mechanism must also be updated every 6 years to account for inflation.

### VI. OTHER REQUIREMENTS FOR ISSUING THIS PERMIT

#### Technical Capability

Ranger Development, LLC has demonstrated the technical competence necessary to carry out the terms and conditions of the permit in accordance with A.R.S. § 49-243(N) and A.A.C. R18-9-A202(B). The permittee is expected to maintain technical capability throughout the life of the facility.

#### Financial Capability

Ranger Development, LLC has demonstrated the financial responsibility necessary to carry out the terms and conditions of the permit in accordance with A.R.S. § 49-243(N) and A.A.C. R18-9-A203. The permittee is expected to maintain financial capability throughout the life of the facility. The closure costs have been estimated as \$126,472. The post-closure costs are estimated to be zero dollars because the regional aquifer (Coconino) is protected via isolation from the stimulation zone, therefore there will be no need for post-closure maintenance or monitoring. The permittee maintains bonds with the Arizona Oil and Gas Conservation Commission in the amount of \$50,000. The financial assurance amount is reduced by \$50,000, from \$126,472 to \$76,472, pursuant to the requirements of A.R.S. §49-243(N)(6). The financial assurance mechanism was demonstrated through a surety bond in the amount of \$76,472, in accordance with A.A.C. R18-9-A204(c)(2).

#### Zoning Requirements

Ranger Development is located in Apache County and is subject to the Apache County Zoning Ordinance (ACZO). Land within the proposed Development are designated as "Land Not Previously Zoned" or "Agricultural General Zone." Per ACZO §403(A)(8), lands are permitted to allow mineral exploration or development as a function of general use. Ranger performs helium extraction from geological structures which can be categorized as mineral exploration or development. As a result, Ranger is in compliance with the requirements of the Agricultural General Zone regarding permitted uses.

## VII. ADMINISTRATIVE INFORMATION

### Public Comment Period (A.A.C. R18-9-109(A))

The Department shall accept written comments from the public prior to granting the permit. The public comment period is in effect from October 27, 2017 to December 5, 2017. Comments may be submitted in writing to: Maribeth Greenslade, ADEQ, Groundwater Section, 1110 West Washington Street, MC5500E-3, Phoenix, AZ 85007 or via email [mg3@azdeq.gov](mailto:mg3@azdeq.gov). Comments must be received or postmarked by December 5, 2017.

### Public Hearing (A.A.C R18-9-109(B))

A public hearing will be held at the Apache County Board of Supervisors' Hearing Room, First Floor, 75 West Cleveland Street, St. Johns, Arizona 85936, on Tuesday November 28, 2017 at 6:00 p.m. The purpose of the hearing is to allow the public to make comments for the record. ADEQ will respond in writing to all comments submitted during the public comment period.

## VIII. ADDITIONAL INFORMATION

Additional information relating to this proposed permit may be obtained from:

Arizona Department of Environmental Quality  
Water Quality Division, Groundwater Section  
Attn: Maribeth Greenslade  
1110 W. Washington St., Mail Code: 5415B-3  
Phoenix, Arizona 85007  
Phone: (602) 771-4578